An integrated knowledge-based framework for synthesis and design of enterprise-wide processing networks

Sin, Gürkan

Publication date:
2012

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Gürkan Sin

* Associate professor at CAPEC, Department of Chemical and Biochemical Engineering, Technical University of Denmark, DK-2800 Kgs. Lyngby, Denmark.

Email: gsi@kt.dtu.dk

Abstract

Today chemical processing industries manufacture a wide range of products and provide services that touch billions of people's lives across the globe in many different ways. Making this requires an effective management of innovation in product and process development. On the other hand, the synthesis and design of processing networks is a complex and multidisciplinary problem, which involves many strategic and tactical decisions at business (considering financial criteria, market competition, supply chain network, etc) and engineering levels (considering synthesis, design and optimization of production technology, its feasibility, sustainability, R&D needs, etc), all of which have a deep impact on the profitability of knowledge based industries. In this talk, an integrated business and engineering framework for synthesis and design of processing network within enterprise wide context is presented. A systematic approach is used to manage the complexity and solving simultaneously both the business and the engineering dimension of the problem. This allows generation and comparison of a large number of alternatives at their optimal point. The result is the identification of the optimal raw material, product portfolio and process technology selection for a given market scenario, their sustainability metrics and risk of investment under market uncertainties enabling risk-aware decision making. The framework is highlighted with successful applications for soybean oil processing (food technology), biorefinery network (renewable chemicals) and wastewater treatment network (petrochemical industry).

Scope and objective

Today chemical processing industries manufacture a wide range of products and provide services that are essential for maintaining wellbeing and sustaining modern lifestyle of mankind.